

The Nisqually River Watershed in southern Puget Sound is the only watershed in the country with its headwaters in a national park and its mouth in a national wildlife refuge. Home for thousands of years to the Nisqually Indian Tribe, the watershed was the first place in the Puget Sound area settled by Europeans in the early 1800's. However, since that time, the rest of the Puget Sound corridor has experienced much more intensive development than the Nisqually watershed.

In addition to the national park and wildlife refuge, a large portion of the lower river is protected by the Fort Lewis Military Reservation and the Nisqually Tribe Reservation. Additional lands along the Nisqually mainstem are protected by Tacoma Power, Centralia City Light, Washington State Parks, and the Nisqually River Basin Land Trust. In total, 67 percent of the riparian lands along the mainstem Nisqually River in the anadromous zone are protected.

The Nisqually is the largest river in Southern Puget Sound. With an average monthly flow in the river of 1350 cubic feet per second, the Nisqually contributes approximately half of the total freshwater input in Southern Puget Sound. Its size compared to other rivers and streams in the region is the reason that the Nisqually has the most productive potential for salmonids in the South Sound. It is home to six species of salmonids: chinook, coho, pink, chum, steelhead and cutthroat trout.

## **Salmon Distribution in the Nisqually**

Maps that show the distribution of salmon throughout the Nisqually Watershed can be found in the Limiting Factors Report. The mainstem river, the Mashel River, Ohop Creek and McAllister Creek are the areas shown by the maps to be utilized by all six species of salmonids.

Historically chinook salmon spawning distribution was around 72 percent in the mainstem, 11 percent in the Mashel, 5 percent in Ohop Creek, 2 percent in McAllister Creek, and 10 percent in the lower reach of all other tributaries combined. Pink salmon distribution was fairly similar to chinook. Coho distribution was also heavy in those areas used by the chinook and pinks but also included more of the smaller tributaries: Muck, Murray, Tanwax, Toboton, Powell, Lackamas, and the lower portion of Yelm Creek.

Steelhead distribution was similar to the chinook and pinks again although they traveled farther up the Mashel system and also used Muck Creek heavily. Some may have also used Toboton, lower Yelm, and lower Horn Creek. Chum distribution was focused more on the mainstem below the Centralia Diversion dam and in prairie creeks such as Muck, the lower reach of Yelm, and the lower reach of Murray. Cutthroat trout are distributed throughout the watershed.

## **Habitat Condition/Limiting Factors**

Salmonid numbers have dramatically declined in the Nisqually over the last 150 years as they have throughout the region. Despite the large amount of mainstem riparian habitat now in a protected status in comparison to other watersheds, degraded freshwater and nearshore/marine habitat has played a large role in the decline of Nisqually salmon.

Hydropower projects, forestry, agriculture, and rural development have all contributed to the degradation.

The first hydropower project was installed on the river at river mile 42 by Tacoma Power in 1912. This project, the Alder – LaGrande Project, was replaced and enlarged in the 1940's. The project was located in a steep canyon that contained waterfalls that were believed to be the upper extent of the anadromous zone so it is believed that this project did not block the passage of salmon to any upstream habitat. The second project established on the river at River Mile 26 by Centralia City Light in 1930 was an 8.5 foot tall diversion dam that diverted water into a canal. The canal ended at the Centralia Powerhouse at River Mile 13 where the water was run through the powerhouse and returned to the river. Although some salmon were still able to pass upstream of the diversion dam, their passage was made considerably more difficult by the dam. A primitive fish ladder was constructed in 1932 and it was improved in 1955 and again in 1985. The diversion canal was screened to prevent the passage of juvenile salmon into the canal in 1955, it was improved significantly in 1999.

The most significant problem with the hydropower facilities for salmon was the flow regime that was controlled by the dam operators. Until 1968 Tacoma Power operated their facility for peak demand causing rapid fluctuations in the level of flow each day, alternating between the dewatering of habitat, including salmon redds, to high volume flows that scoured redds and habitat. In addition, no minimum flows were established along the river until 1978 for either hydropower facility, resulting in the Centralia Diversion stretch of the river being effectively dewatered from August to October. Today the hydropower facilities no longer operate for peak demand and must meet minimum flows. This has significantly improved the habitat for salmon in the mainstem river.

Although the most significant problems with hydropower impacts to salmon habitat have now been addressed, there are still other serious causes of habitat degradation that are limiting the productivity of the watershed. Below is a summary of some of the more important limiting factors in certain reaches of the watershed.

For more detailed information about each reach readers can refer to the Nisqually Chinook Recovery Plan or the Nisqually Watershed's Limiting Factors Report. The Limiting Factors Report was published in January 2000. The report was developed with the assistance of the Nisqually Technical Advisory Group, of which some of the members were simultaneously assisting in the development of the Chinook Recovery Plan.

The Recovery Plan was published in August 2001. It uses the Ecosystem Diagnosis and Treatment (EDT) Model to model the relative impacts of the condition of habitat in the Nisqually on the productivity, capacity, and the diversity of life histories of Nisqually chinook. The plan presents a list of the reaches within the Nisqually and prioritizes them based on their relative benefits for restoration or preservation of habitat. It also contains an action plan for the recovery of naturally produced Nisqually salmon developed by fisheries scientists working in the basin using the results of the analysis and their personal knowledge. The plan includes actions to protect and restore habitat as well as actions to modify hatchery and harvest practices.

The plan lays out goals on several time scales including a 15 year action plan, a set of 50 year goals, and a set of 50 –100 year goals. These long term goals are:

1. Assure natural production of fall chinook in perpetuity by providing high quality, functioning habitat and by promoting the development of locally adapted, functioning populations.
2. Assure sustainable harvest opportunities.
3. Provide significant contributions to the recovery of other threatened or endangered species.
4. Secure and enhance natural production of all salmonids.
5. Assure that the economic, cultural, social, and aesthetic benefits derived from the Nisqually ecosystem will be sustained in perpetuity.

Although the Recovery Plan is based on EDT results for chinook the plan also seeks to secure and enhance the natural production of all salmonids. Consequently, the action plan includes actions that are believed to provide benefit to other salmonids in the watershed. There are also plans for a Multispecies Recovery Plan using the same model used in the Chinook Recovery Plan. This plan will be completed sometime in 2002. The Salmon Recovery Plan describes a process for adaptive management to ensure that while the action plan is being implemented it is also continually evaluated and updated as new knowledge and opportunities present themselves.

### *Estuary:*

Despite the fact that the Nisqually Wildlife Refuge and the Nisqually Indian Tribe protects a large portion of the estuary, half of the original estuary is behind dikes that were originally built by farmers to create pastureland. Interstate 5 also effectively acts as a large dike separating the uppermost portion of the original estuary. Consequently a large portion of the estuarine habitat that was historically available for outmigrating smolts from the Nisqually, as well as other migrating salmon in Puget Sound, is no longer there.

The Nisqually Chinook Recovery Plan has identified the estuary as the highest priority area for restoration of salmon habitat. It is estimated that restoration of all available habitat within the estuary alone would result in a doubling of naturally produced chinook in the watershed. It is also believed that restoration of estuary habitat would significantly benefit the other salmonids in the watershed.

### *Mainstem Nisqually:*

Although the reach that passes through Fort Lewis and the Nisqually Indian Reservation is one of the best remaining examples of what a free-flowing lowland Puget Sound River should look like, the rest of the mainstem is not in such a pristine condition. The amount of habitat degradation varies by the particular reach. There are some parts of the river that are still in fairly good condition that are in serious need of protection as urban pressures to along the river increases. There are other parts of the river that have had the banks hardened, river dikes have been built along certain sections, the connections to off-channel habitat has been lost, and considerable amounts of riparian vegetation have been removed. For the most part, many of these areas still retain a rural character (low density housing and

low percentage of impervious surfaces), which will make it easier to restore habitat if landowners are willing.

The mainstem Nisqually is used by all six salmonids in the watershed: chinook, pink, coho, chum, steelhead, and cutthroat trout. While the others will typically travel the length of the mainstem, up to its confluence with the Mashel, chum tend to concentrate on the reaches below the Centralia Diversion Dam.

The Recovery Plan has identified many of the reaches along the mainstem as high priority for preservation. In areas where the habitat has been degraded the plan also recommends that they be high priorities for restoration, after the estuary and the two major tributaries, the Mashel and Ohop.

### *Mashel River*

The Mashel is the largest tributary to the Nisqually in the anadromous zone. It is one of the main areas outside the mainstem that is still heavily used by salmon in the watershed. Chinook, pinks, coho, steelhead, and cutthroat trout are all found in higher numbers in the Mashel than many of the other tributaries.

The lower reach of the Mashel is still mostly in good condition, protected on one side by Washington State Parks and on the other by the University of Washington's Pack Forest. It is used as an index area for counting chinook, pinks, and steelhead. However there are some portions of the reach that are still impacted by old roads and past forestry practices. The roads are transporting fine sediments into the river and there is a significant loss of large woody debris in the system.

The middle reach of the Mashel that passes through the city of Eatonville is in a significantly degraded condition. Banks have been hardened, there has been a significant loss of off-channel habitat and riparian vegetation, and there is a need for more large woody debris.

The upper reaches of the Mashel and its tributaries are in forestry lands. These areas suffered significant damage from past forestry practices which resulted in massive landslides and scour events. At present the area is recovering, however there are still issues primarily with sediment that is being transported from forestry roads into the river. For more information about these impacts refer to the Mashel Watershed Analysis. These lands are now regulated by the recently developed Fish and Forest Plan.

The Mashel is ranked as the highest priority freshwater area for restoration in the Nisqually by the Recovery Plan.

### *Ohop Creek*

After the Mashel, Ohop Creek is the next most significant tributary to the Nisqually both in terms of flow and salmon usage. Chinook, pinks, and coho all use this tributary heavily along with some steelhead and cutthroat trout. The lower 0.3 miles of Ohop is in fairly good condition with a developing riparian forest and good stream form. From 0.3 to river mile 4.5, however, the habitat available in Ohop is significantly degraded. It has been highly

modified by farming practices that have put the creek in a very deep ditch and drained the surrounding wetlands. The result has been a loss of all off-channel habitat, natural stream sinuosity, connection to a floodplain, and very little riparian vegetation or large woody debris. Upstream of river mile 4.5 to Ohop Lake the stream is not as heavily impacted. It is not channelized, has some pool-riffle habitat and a narrow band of riparian vegetation in places. However, development in this reach, which is closest to the city of Eatonville, is ongoing and pressures continue to grow for the creek. Upstream of the lake there is some good habitat available; however, there is still a need in some places for more riparian vegetation and large woody debris.

Ohop Creek is ranked second only to the Mashel by the Recovery Plan as a freshwater habitat area that should be high priority for restoration and is particularly important as a source of life history diversity.

#### *Yelm Creek*

This creek is representative of many of the other smaller tributaries which flow into the Nisqually. It is referred to as a prairie creek because it flows across part of the prairies that are found throughout the South Sound region. The prairies are located on soils formed on the huge glacial outwash plains from the glaciers that carved out Puget Sound. These soils are very porous resulting in a direct connection between surfacewater and groundwater. Yelm Creek, as many of the other prairie streams, is an intermittent stream along much of its length. The water levels in the creek drop in the summer and early fall when the groundwater levels drop.

Much of its middle length, especially through the city of Yelm, has been channelized and the riparian vegetation removed. The creek has serious problems with the invasion of reed canary grass throughout this reach. This reach was used at one time by coho and perhaps chum although salmon have not been seen in this reach for many years.

The lowermost reach of the creek is significantly different than the middle reach. This reach has year-round flow. It sits on a different soil type than the prairie soils. It has some good riparian vegetation. However it is being affected by livestock that are able to access the creek. There has been some loss of riparian vegetation and addition of sediment into the creek. This reach is an index area for chum escapement estimates, as well as used by some chinook, pinks, coho, steelhead, and cutthroat trout. Like many of the lowermost reaches of the smaller tributaries, this lower reach of Yelm is important because it helps increase the diversity of life history of salmon in the watershed, even if it is not contributing in large part to the overall productivity of the watershed.

#### *Muck Creek*

Muck Creek is the largest of the prairie creeks in the Nisqually watershed. Its watershed area is about the same as the Mashel River's. However, because it passes across the prairie geology its flow is very different than the Mashel's. It is intermittent along much of its length as are many of the prairie streams. In the winter however the flows in Muck Creek swell to almost 200 cubic feet per second.

Muck is used most heavily by chum salmon. Approximately one third of the chum in the Nisqually use Muck Creek to spawn. It is also used by winter steelhead and sea-run cutthroat.

The lowermost reach of Muck Creek runs through Fort Lewis and is in fairly good condition. It is used as an index area for chum salmon counts. Upstream of rivermile 4 the creek has been channelized in places and has limited riparian vegetation. A major problem in the creek is the invasion of reed canary grass which completely closes off the flow of the creek in some places.

### *McAllister Creek*

This creek is not currently a direct tributary to the Nisqually River but instead flows into the Nisqually Estuary along the western side. It is used by all six species of salmonids in the Nisqually watershed.

The lowermost portion of the creek is in fairly good condition as it flows through the Nisqually Wildlife Refuge. It contains some good estuarine habitat although it is bordered on its eastern side by the large dike that surrounds much of the Refuge.

Upstream of I-5 the creek runs mainly through agricultural lands. The channel is fairly confined through this reach, it has poor riparian vegetation, and is very deficient in large woody debris. There is a Washington State salmon hatchery located along this reach which releases chinook salmon. However, the hatchery has to raise the salmon off-site part of the time because of the presence of the pathogen *Nanophyetus salmincola* in McAllister Creek that attacks juvenile salmon both in the hatchery as well as in the creek.

## **Prioritizing Salmon Recovery Projects**

The two major tools available to assist in prioritizing salmon recovery projects in the Nisqually watershed are the Nisqually Chinook Recovery Plan (2001) and the Nisqually Salmon and Steelhead Habitat Limiting Factors, Final Report (2000). Additional information about the condition of habitat in parts of the watershed can be found in the Watershed Analyses and a series of water quality reports.

A preliminary ranking system has been developed for proposed Nisqually SRFB projects that evaluates the relative benefit and certainty of each project. It uses the current information about the watershed available in the Recovery Plan, the Limiting Factors Report and other knowledge about salmon and their habitat in the Nisqually to evaluate the benefits that would result from the project. It also considers the quality of the proposal and the contribution to increased public support to evaluate the certainty of the project.

Ranking the geographic priorities in the watershed was taken from the Nisqually Chinook Recovery Plan's evaluation of reaches importance for restoration and preservation of habitat. This ranking was then adjusted to account for differential values of habitats not critical to chinook but important for other salmonid species. The primary ranking for the reaches where species distribution overlapped with the chinook were left the same because many of

these areas are also used by the other salmonids. The rankings are in part a reflection of the relative condition of habitat in these reaches and so would not shift dramatically for other species.

## NISQUALLY WATERSHED SALMONID RECOVERY PROJECT EVALUATION FORM

Points possible	Points Given	Criteria
16		<b>Geographic Priority:</b>
		<table><tr><td><b>Restoration:</b> (16) Estuary (14) Puget SoundNearshore (13) Mashel (12) Ohop (11) Nisq. Lower Reach 2A (10) McKenna Reach (9) Whitewater Reach (8) Misc. tributaries (6) McAllister (5) Reservation Reaches (4) Wilcox Reaches (3) Upper Reaches (2) Middle Reaches (1) all other reaches  if project to benefit coho: add 1 point to (8) in Tanwax, Lackamas, Toboton, Powell, Murray, Muck and lower Yelm.  if project to benefit chum: add 1 point to (8) in Muck, lower Yelm, and Murray  if project to benefit steelhead: add 1 point to (8) in Muck, Toboton, lower Yelm and lower Horn</td><td><b>Preservation:</b> (16) Reservation Reaches (15) Whitewater Reaches (14) McKenna Reaches/ lower reach of misc. tributaries (13) Middle Reaches (12) Mashel River/ Wilcox Reaches (11) Lower Reaches (10) Ohop Creek (9) Upper Reaches (8) McAllister Creek (7) all other reaches</td></tr></table>
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12		2. Number of salmonids benefitted by project. ( 1 point per species somewhat benefitted, 2 points per species fully benefitted)



10		3. Is the project addressing all the important habitat conditions in the project area? Use the EDT reach analysis charts and the limiting factors report to identify the important habitat conditions.
10		4. Is the project considering long-term processes?
10		5. Is the project listed in the Chinook Recovery Plan's action plan or the Limiting Factors Report?
10		6. Will the project increase public support for salmon recovery in the Nisqually Watershed?
10		7. Does the cost of the project match the benefits?
10		8. Does the geographic scale of the project encourage continuity with other preservation or restoration projects? (e.g. size of area encompassed by the project, is the project adjacent to existing projects, protected areas)
10		<p><b>9. Restoration project:</b> Does the project have a plan for monitoring and maintenance to ensure long term success?</p> <p><b>Acquisition project:</b> Does the sponsoring organization have a structure or established record to ensure long-term protection of the site?</p> <p><b>Assessment project:</b> Is there a plan for clear reporting and use of the data to develop projects?</p>
10		10. Overall benefit and certainty of the project.

**Current ongoing salmon recovery projects**

The Recovery Plan has identified the estuary as the most important area for restoration. Much of the land in the estuary falls within the Nisqually Wildlife Refuge. The Refuge contains approximately 1000 acres of land that was diked by farmers to convert saltmarsh into farmable areas. The Refuge is currently conducting a Comprehensive Planning effort to evaluate alternative future plans for the site including one alternative that would restore around 750 of those acres back to estuarine habitat. They will be taking public comment on the alternatives during the winter of 2001-2002 and releasing a final plan sometime in 2002.

The other major land owner within the estuary is the Nisqually Indian Tribe. This land lies east of the Nisqually River and was recently purchased by the Tribe from the last remaining private land owner in the estuary. This land contains approximately 320 acres of diked land that could be restored to estuarine habitat. The Tribe received funds from the SRFB 2000 funding cycle to begin the first phase of that restoration. The work is scheduled to take place in the summer of 2002.

Moving upstream from the estuary the mainstem of the river has been ranked as a high priority for preservation. Although this effort over the last fifteen years has been very successful, resulting in 67 percent of the riparian corridor currently in a protected status, there are still additional areas in need of protection.

The freshwater habitat ranked as highest priority for restoration in the Recovery Plan, the Mashel River, does not currently have any active restoration work or planning for restoration. There is a need to develop relationships with the landowners and the community along the Mashel and to work together to identify specific restoration projects that would benefit salmon and be supported by the community.

The next most important tributary for restoration, Ohop Creek, has had some activity which has focused on riparian vegetation plantings up to this point. There have been a few different planting projects along different parts of the creek including the most recent one in March 2001 where 200 community volunteers planted 2000 plants on a Wetland Reserve Property adjacent to the creek. In addition to these volunteer events, the Nisqually Indian Tribe received a small grant to develop a general plan for restoration alternatives for Lower Ohop Creek. The next phase of this project would be to work with the landowners along lower Ohop to develop a plan that they are happy with. Then specific project designs could be developed. The tribe currently does not have funding to implement this next phase.

Most of the restoration work in the watershed up to this point has taken place on Muck Creek. Fort Lewis's wildlife department in conjunction with the Nisqually Indian Tribe has actively been restoring salmon habitat along Muck Creek where it flows across the Fort's lands. In addition, the Pierce Conservation District and the Natural Resources Conservation Service have partnered with the Muck Creek Council and the Nisqually Indian Tribe to work with landowners on Muck Creek in the Roy area to implement restoration projects that link with the projects on Fort Lewis. These projects have created a considerable amount of community involvement and support with volunteers turning out for numerous riparian planting projects, and the celebration of the return of thousands of chum salmon in the creek in the town of Roy.

## Community Involvement and Process

The Nisqually Watershed has one of the oldest river councils in Washington State; the Nisqually River Council was formed by the Nisqually River Management Plan in 1987. Since that time the Council has brought together all of the stakeholders in the watershed for monthly meetings to discuss topics relevant to the management of the watershed. The Council has no regulatory authority and is not a registered non-profit organization. Its effectiveness is in its ability to implement actions through the agreement of its members. One of its greatest strengths is the opportunity it provides for all the folks working in the Nisqually to meet on a regular basis and develop comprehensive strategies to address common issues.

The Council has two main committees that assist in the evaluation of salmon recovery projects as part of the Salmon Recovery Funding Board process: the Citizens Advisory Committee and the Natural Resources Committee. The Citizens Advisory Committee is made up of private citizens that are interested in issues involving the watershed. They meet monthly, providing feedback on issues the Council is considering and raising new issues to the Council. The Natural Resources Committee membership is composed of representatives of the agencies and organizations that deal with natural resource management in the watershed and citizens who are particularly interested in natural resource management issues. They meet monthly to discuss current natural resources issues and make recommendations to the Council for action.

The Natural Resources Committee has created a new subcommittee called the Nisqually Salmon Habitat Workgroup. The workgroup's task is to work together to implement the habitat portion of the Nisqually Salmon Recovery Plan. The Workgroup meets monthly to use the action plan to determine what projects should be implemented first, who would like to sponsor them, to evaluate and prioritize the projects for the SRFB process, to coordinate implementation efforts, and to monitor and revise the habitat action plan as necessary.

The process that has been established for the 2001 round of SRFB applications in the Nisqually Watershed is as follows:

- Aug. 31 – applicants must file a pre-application notification of intent to apply
- Oct. 12 – project applications due to Nisqually lead entity (Nisqually Tribe)
- Oct. 23 – project applicants give a short presentation about their proposal to the Workgroup, possibly a fieldtrip to proposed project sites.
- Oct. 25 – Workgroup reviews, develops proposed project ranking
- Nov. 1 – Nisqually River Council Citizen Advisory Committee meets, reviews proposed ranking of projects, provides input
- Nov. 6 – Nisqually River Council Natural Resources Committee meets, proposed project ranking are reported to them, provides input
- Nov. 16 – Nisqually River Council meets, reviews project ranking and additional comments, makes final recommendations
- Nov. 30 – lead entity applications due to SRFB

The Nisqually River Management Program has helped create a cooperative and productive environment for all the members of the Nisqually Watershed Community to work together on issues of importance to them and the watershed. For a number of years there has also been an education effort affiliated with the Management Program called the Nisqually River Education Project. The Education Project works with students throughout the basin to teach them about watershed health and involve them in monitoring the health of the watershed and helping in active restoration projects.

Most recently a new education and involvement program called the Nisqually Stream Stewards Program was formed that focuses on involving the public in salmon habitat protection and restoration. The Stream Stewards Program organizes training workshops for the local community to learn about salmon habitat, involves them in monitoring the condition of salmon habitat in the watershed and in helping to restore habitat through riparian tree plantings and carcass return programs. The ultimate goal of the Stream Stewards program is to facilitate a greater awareness in the community about how to protect and restore salmon habitat and consequently develop greater public support for salmon recovery activities.